

REMARKS/ARGUMENTS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1 and 3-6 are pending in the application. No claim amendments are presented, thus no new matter is added.

In the Office Action, Claim 1 was rejected under 35 U.S.C. § 102(b) as anticipated by Gans et al. (U.S. Pat. 5,604,462, herein Gans); and Claims 3-6 were rejected under 35 U.S.C. § 103(a) as unpatentable over Gans in view of Hongo et al. (U.S. Pub. 2003/0053552, herein Hongo) and Wright et al. (U.S. Pat. 7,260,365, herein Wright).

Regarding the rejection of Claim 1 under 35 U.S.C. § 102(b) as anticipated by Gans, Applicants respectfully traverse this rejection, as independent Claim 1 recites novel features not disclosed by Gans.

Amended independent Claim 1 relates to a transmitter which detects distortion components produced by a power amplifier, and uses the detected distortion components in predistorters to produce a compensation signal to cancel the distortion components at the power amplifiers. More particularly, Claim 1 recites, in part, that the transmitter includes:

an input-side ***digital*** multi-port directional Butler matrix coupler configured to divide and combine ***digital*** transmission signals of N channels by ***digital processing***...

As described at p. 4, ll. 14-22 of the specification, in order to achieve a sufficiently high degree of isolation between the output ports of the input side digital multi-port directional coupler 10, its gain and phase deviations between channels need to be adjusted to be sufficiently smaller than predetermined values, and the manufacture of such multi-port directional couplers in large numbers of ports requires highly precise adjustment skills. Therefore, a circuit configuration that permits simplification of such adjustment is desired.

According to the claimed configuration, as described in an exemplary embodiment at p. 6, ll. 21-24 of the specification, by performing the function of the multi-port directional coupler 13 through digital processing, it is possible to achieve characteristics of the multi-port directional coupler with ideal gain and phase deviations without reliance on manufacturing skills. Further, p. 8, ll. 1-4 of the specification describes that the claimed processing technique allows elimination of imperfection of the operating characteristic of the input side multi-port directional coupler 13 formed by an analog circuit.

Turning to the applied reference, Gans describes an intermodulation distortion (IMD) detection system that improves IMD reduction capability of power shared linear amplifier networks. In rejecting the claimed features directed to the input-side multi-port directional Butler matrix coupler recited in Claim 1, the Office Action cites the power sharing network 14, 202 and 940 depicted in Figs. 1-2, 9 and 11. As described at col. 3, ll. 10-32 and col. 30-45 of Gans, the power sharing network may be a Butler Matrix that directly receives RF signals  $S_1$  to  $S_N$ , which are frequency division multiplexed (FDM) signals having “many frequency channels, and is transmitted by respective beam  $B_1$  to  $B_N$ .” Moreover, col. 3, ll. 19-30 specifically describes that the power sharing network divides each signal  $S_1$  to  $S_N$  among M output ports resulting in a variant in both signal strength and phase gradient of these signals. Thus, Gans describes that the Butler Matrix used in his system is an analog Butler Matrix that is specifically configured to process received RF signals.

Therefore, Gans fails to disclose a transmitter including “an input-side ***digital*** multi-port directional Butler matrix coupler configured to divide and combine ***digital*** transmission signals of N channels by ***digital processing***,” as recited in independent Claim 1.

As noted above, since the input side multi-port directional coupler, which is formed by an analog circuit in Gans, is implemented by digital signal processing in the claimed configuration, the gain and phase deviations between the output ports can be reduced to zero.

Zeroing the gain and phase deviations in the analog circuit is impossible in terms of circuit fabrication accuracy. Accordingly, digital signal processing permits simplification of the circuit adjustment as compared with a conventional analog circuit configuration, as described in Gans.

Therefore, as noted above, the claimed configuration implements “an input-side ***digital*** multi-port directional Butler matrix coupler configured to divide and combine ***digital*** transmission signals of N channels by ***digital processing***.” The use of a digital coupler eliminates the need for adjusting the gain and phase deviations between respective channels to be smaller than design values so as to provide a predetermined or greater degree of isolation between the output ports of the input side multi-port directional coupler. Moreover, the claimed configuration ensures complete isolation between the output ports of the input side directional coupler without any adjustment and hence enables the gain and phase deviations to be made zero. Accordingly, the claimed configuration needs only adjustment of the output side multi-port directional coupler and provides an increased degree of isolation of the multi-port configuration by less adjustment than in a system employing an analog coupler. Gans fails to disclose a solution to achieve perfect adjustments (gain and phase deviation being zero) employing a digital signal processing coupler, as claimed.

Therefore, Gans fails to disclose “an input-side ***digital*** multi-port directional Butler matrix coupler configured to divide and combine ***digital*** transmission signals of N channels by ***digital processing***,” as required by independent Claim 1.

Accordingly, for at least the reasons discussed above, Applicants respectfully request the rejection of Claim 1 under 35 U.S.C. § 102 be withdrawn.

Claims 3-6 were rejected under 35 U.S.C. § 103(a) as unpatentable over Gans in view of Hongo and Wright. Claims 3-6 depend from Claim 1 and are therefore believed to be

patentable for at least the reasons discussed above. Further, Applicants respectfully submit that neither Hongo nor Wright remedy the above noted deficiencies of Gans.

Accordingly, for at least the reasons discussed above, Applicants respectfully request the rejection of Claims 3-6 under 35 U.S.C. § 103 be withdrawn.

Consequently, in view of the present amendment and in light of the foregoing comments, it is respectfully submitted that the invention defined by Claims 1 and 3-6 is patentably distinguishing over the applied references. The present application is therefore believed to be in condition for formal allowance and an early and favorable action is therefore requested.

Respectfully submitted,

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